

Bob is very interested in the data structure of a tree. A tree is a directed graph in which a special node is singled out, called the “root” of the tree, and there is a unique path from the root to each of the other nodes.

Bob intends to color all the nodes of a tree with a pen. A tree has  $N$  nodes, these nodes are numbered  $1, 2, \dots, N$ . Suppose coloring a node takes 1 unit of time, and after finishing coloring one node, he is allowed to color another. Additionally, he is allowed to color a node only when its father node has been colored. Obviously, Bob is only allowed to color the root in the first try.

Each node has a “coloring cost factor”,  $C_i$ . The coloring cost of each node depends both on  $C_i$  and the time at which Bob finishes the coloring of this node. At the beginning, the time is set to 0. If the finishing time of coloring node  $i$  is  $F_i$ , then the coloring cost of node  $i$  is  $C_i * F_i$ . For example, a tree with five nodes is shown in Figure-1. The coloring cost factors of each node are 1, 2, 1, 2 and 4. Bob can color the tree in the order 1, 3, 5, 2, 4, with the minimum total coloring cost of 33.

Given a tree and the coloring cost factor of each node, please help Bob to find the minimum possible total coloring cost for coloring all the nodes.

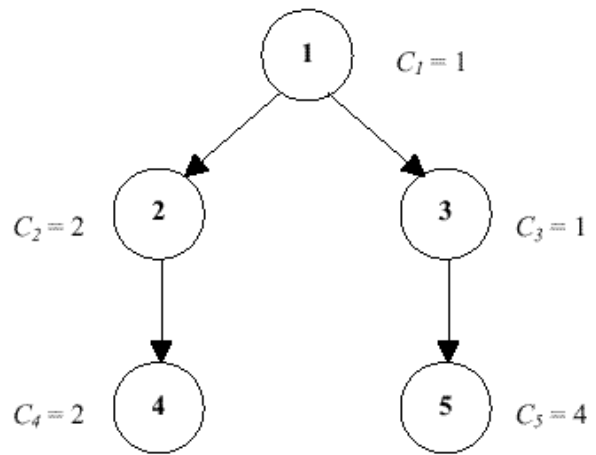


Figure-1. A tree with five nodes

## Input

The input consists of several test cases. The first line of each case contains two integers  $N$  and  $R$  ( $1 \leq N \leq 1000, 1 \leq R \leq N$ ), where  $N$  is the number of nodes in the tree and  $R$  is the node number of the root node. The second line contains  $N$  integers, the  $i$ -th of which is  $C_i$  ( $1 \leq C_i \leq 500$ ), the coloring cost factor of node  $i$ . Each of the next  $N - 1$  lines contains two space-separated node numbers  $V_1$  and  $V_2$ , which are the endpoints of an edge in the tree, denoting that  $V_1$  is the father node of  $V_2$ . No edge will be listed twice, and all edges will be listed.

A test case of  $N = 0$  and  $R = 0$  indicates the end of input, and should not be processed.

## Output

For each test case, output a line containing the minimum total coloring cost required for Bob to color all the nodes.

## Sample Input

```
5 1
1 2 1 2 4
1 2
1 3
2 4
3 5
0 0
```

## Sample Output